

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604**

DATE: 'JUN 5 2014

SUBJECT: INSPECTION REPORT – Savoy Energy, L.P., Adrian 25 facility, Adrian, MI

**FROM: Natalie Topinka, Environmental Scientist
AECAS (IL/TN)**

**THRU: Nathan Frank, Chief
AECAS (IL/TN)**

TO: File

Date of Inspection: April 28, 2014

Attendees: Natalie Topinka, Environmental Scientist, U.S. EPA
Katharina Bellairs, Environmental Engineer, U.S. EPA
Kristy Shimko, Geologist, MDEQ
Jack Rokos, Operations Manager, Savoy Exploration, Inc.
Wayne Cockrum, Senior Engineer, Environmental Consulting & Technology, Inc.
Christopher Taylor, Area Compliance Manager, EMSI
Jodi Lindgren, EMSI

Purpose of Inspection: The purpose of conducting an inspection of Savoy Energy, L.P.'s Adrian 25 facility was to respond to a citizen complaint of odor and related adverse health effects.

Company Description and Background:

Location: Highway 52 and Howell Highway, Section 25, Lat: 41° 55' 28.763",
Long: -84° 00' 55.554", Adrian Township, Lenawee County, Michigan

Primary Contact: Jack Rokos, Operations Manager

Savoy Energy's Adrian 25 facility has been producing oil and natural gas since at least early 2013. On March 27, 2014, MDEQ issued to Savoy a Permit to Install a natural gas fired reciprocating engine (the compressor) to allow Savoy to direct natural gas to sale. Savoy was founded in 1989 and currently has approximately 12 or fewer permanent employees and 50-100 contractors at any one time who work at the day-to-day operations of Savoy's oil wells and

processing facilities in Michigan.

Selected Applicable Regulations:

40 CFR Part 60 Subpart OOOO - Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution

40 CFR Part 63, Subpart HH – National Emission Standards for Hazardous Air Pollutants from Oil and Natural Gas Production Facilities

40 CFR Part 63, Subpart ZZZZ – National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines

Opening Conference

Katharina Bellairs and I arrived at the Adrian 25 facility at approximately 3:35 pm local time on Monday, April 28, 2014. Before entering the site, we drove past the facility heading northeast on Route 52. I smelled a faint petroleum-like odor as we passed by. We met Kristy Shimko of MDEQ at the site. Also on-site at that time were Jack Rokos of Savoy Energy, Wayne Cockrum of Environmental Consulting and Technology (ECT), and Jodi Lindgren and Chris Taylor of EMSI. Ms. Bellairs and I presented our credentials and exchanged business cards with others present. The ECT and EMSI representatives were at the facility to do an initial assessment of components that would be subject to leak detection and repair (LDAR) requirements under NSPS OOOO. Mr. Cockrum stated that the facility had 180 days to prepare its LDAR plan and demonstrate initial compliance after startup of the compressor, and was within that timeframe.

The weather was approximately 45°F with gusty winds from the east, and brief periods of light rain, so we convened in the building housing the compressor to conduct our opening conference. We explained that the inspection was prompted by a citizen complaint of odor and allegedly related adverse health effects. We asked Mr. Rokos to give us an overview of operations at the facility.

The following information was obtained from Mr. Rokos' description of the facility, our on-site observations, and supplemental information from the facility's Permit to Install 23-14 from MDEQ.

Adrian 25 Facility Overview

The Adrian 25 facility processes oil, water, and natural gas that is piped to the facility from seven nearby wells. The oil/water/gas emulsion arrives at the facility from each well and travels through a line heater, which uses methanol as an antifreeze. The oil/water/gas then goes to a "heater treater" which separates the emulsion into individual components. The heater treaters each have a gas-fired burner as the source of heat. There are seven line heaters and seven heater

treaters, one for each well (photo 2). Each well is metered individually to ensure that per-well production limits are complied with and also to ensure that the property owner where the well is located is properly compensated.

From the heater treater, the oil and water are piped to on-site storage tanks. At the Adrian 25 facility, there are four oil tanks and four water tanks, each with a capacity of 400 barrels. The tanks operate at ambient pressure and the oil is heated to about 100°F to allow it to be pumped easily. Mr. Rokos stated that the pressure rating of the tanks was 1 psi, and is typical for oil tanks in this application. The eight tanks are each equipped with spring-loaded thief hatches for checking liquid levels on about a daily basis. The tanks also share a common vapor recovery system which routes emissions from the tanks to a flare. The flare has a fuel line to maintain a pilot light and a large barrel shroud to protect the flame from wind and to reduce flame visibility (photo 8). Mr. Rokos stated that the pilot light is checked two or three times per day to ensure that it remained lit. Vapors from the tanks' headspace are piped to the flare at ambient pressure (no fan or pump is used to draw vapors from the tanks to the flare). Since the system uses a common collection line, vapors from each individual tank can flow to the headspace of any other tank. The vapor collection lines are equipped with two Enardo pressure relief valves. The tank system has a line for loading oil into trucks and a line that vents vapors during loading to the flare (photo 10) Mr. Rokos stated that the Adrian 25 facility is serviced by two to three oil trucks per day.

The gas travels to a 4-stage compressor which increases the pressure from about 20 psi to approximately 650 psi (photo 4). The compressor began operating on April 8, 2014 and is equipped with a catalytic converter as an air pollution control device. The crude gas/oil mixture does not contain any sulfur compounds, so no "sour gas" treatment is necessary.

The compressed gas then goes to the glycol dehydrator where water is removed (photo 3). The dehydrator is equipped with a condenser to remove steam and VOCs (primarily "BTEX" – benzene, toluene, ethylbenzene, and xylene). The gas then is piped to the refrigeration plant (photo 7) where it is cooled to -40°F so the propane can be stripped out. Mr. Rokos did not know the type of refrigerant used but he stated that he assumed it was "Freon." The propane is then stored on-site in a 30,000 gallon tank (photo 11) until it is transported to sale via truck. The propane tank is pumped out approximately once per week to ten days. Methane and ethane are pulled off the propane tank and used as fuel gas for various pieces of equipment at the facility. From the refrigeration plant, the gas is piped to the sales line. The gas line is also connected to the flare – if there is a pluggage in the gas line, the gas will back up and vent to the flare. Prior to April 8, 2014, all gas was sent to the flare.

The Adrian 25 facility processes approximately 700,000 scfm of gas and 700 barrels of oil per day. The facility is allowed to produce 200 barrels of oil per day per well. Savoy has the capacity to add three more wells at this site.

Facility Tour

We conducted a preliminary walk-through and viewed the line heaters, heater treaters, glycol dehydrator, compressor, refrigeration plant, propane tank, oil and water tanks, and the flare. Observation of the flare showed a continuously lit pilot light and small bursts of flame when gases were vented to the flare (photo 9). We then received permission from Mr. Rokos to use our infrared (IR) camera and photo ionization detector (PID). Ms. Bellairs and I spent about 10 minutes in the car to power on the IR camera and allow it to cool down. During that time we also calibrated the PID using 10 ppm isobutylene calibration gas.

During our IR camera and PID survey, we observed a few small leaks at the compressor (photos 5 & 6 and videos MOV_0445 through 0459).

At the base of the tank battery, the petroleum-like odor was easily noticeable. We ascended the stairway to observe the hatches and pressure relief devices on the four oil tanks (Mr. Rokos stated that the tanks were not referred to by any particular identification number or naming designation). We observed via the IR camera a leak on the Enardo pressure relief valve above the northeastern most oil tank (videos MOV_0442 & 0443) and a leak from the thief hatch of another oil tank (videos MOV_0444 through 0446).

We ascended the stairway to the walkway at the top of the four water tanks. We observed leaks via the IR camera on the thief hatches of the northeast, southeast, and southwest water tanks. When the PID probe was positioned at the seal of each thief hatch, the PID read 370, 345, and 327 ppm, respectively. While observing the hatch of the southeastern most water tank, an episode of pressure relief occurred and the thief hatch was visibly raised up, we heard a loud hissing noise, and the escaping vapors were visible to the naked eye (the air immediately around the seal of the hatch looked "shimmering," similar to heat waves) (video MOV_0448). I was standing about five feet from the hatch (downwind) and the PID read 90 ppm. The odor was overwhelming so we descended the stairs quickly. Emissions were still visible with the IR camera from the ground (video MOV_0449).

All leaking components at the compressor and from the thief hatches and pressure relief device were pointed out to Savoy representatives.

Closing Conference

We gathered briefly for a closing discussion. I expressed concern that the pressure relief valves and thief hatches were not properly weighted to ensure that vapors are first directed to the flare, then to the Enardo pressure relief valves in the case of an overpressurization event, and then to the thief hatches, in that order. Mr. Rokos stated that he would have the thief hatch seals inspected and add additional weight to the hatches to ensure that they were not venting at pressures lower than necessary. Mr. Rokos did not claim any of the information discussed or

photos as confidential business information. We thanked the facility representatives for their time and departed at about 5:45 pm.

Photos



- 1) View approximately from the tank battery, looking WNW. Note the proximity of the house and public highway to the facility.



2) Heater treaters



3) Glycol dehydrator (horizontal cylinder) with condenser (at left).



4) EPA inspector Katy Bellairs viewing the compressor with the IR camera.



5) Component (box with two dials) on compressor that was observed to be leaking using the IR camera (video MOV_0456).



6) Component (the rightmost of two vertical pipes capped on top) on compressor that was observed to be leaking using the IR camera (MOV_0458).



7) Chiller/refrigeration plant



8) Flare



9) Flare flames through viewing portal in shroud. Continuous pilot flame is on right, gas line and flared gas is on left.



10) Oil loading with drain.



11) Propane tank.

IR Video Log

Video ID number	Description
MOV_0442.mp4	Leaking Enardo valve above NW oil tank
MOV_0443.mp4	Leaking Enardo valve above NW oil tank
MOV_0444.mp4	Leaking thief hatch on oil tank
MOV_0445.mp4	Leaking thief hatch on oil tank, obscured
MOV_0446.mp4	Latter part of video shows leak on SE oil tank thief hatch
MOV_0447.mp4	Leaking thief hatch on SE water tank
MOV_0448.mp4	Leaking thief hatch on SE water tank
MOV_0449.mp4	Leaking thief hatch on SE water tank, viewed from ground level
MOV_0450.mp4	Leaking thief hatch on water tank
MOV_0451.mp4	Leaking thief hatch on water tank
MOV_0452.mp4	Flare
MOV_0453.mp4	Leaking thief hatch on water tank – poor video quality
MOV_0454.mp4	Deleted – recorded in error – no image
MOV_0455.mp4	Leaking compressor component
MOV_0456.mp4	Leaking compressor component
MOV_0457.mp4	Leaking compressor component
MOV_0458.mp4	Leaking compressor component
MOV_0459.mp4	Leaking compressor component